CrustBuster SPEED KING INC.

SureFire Ag Systems

# DrillMaster

## Grain Drill Section Controller

# REFERENCE MANUAL

SureFire Ag Systems

# Installation

## *Mounting the Display Console*

Select a mounting location which seems most workable, and that best fits your needs. It should be convenient to reach and highly visible to the operator. DO NOT INSTALL IN A POSITION THAT OBSTRUCTS THE VIEW OF THE ROAD OR WORK AREA. Whenever possible, avoid locations that expose the console to direct sunlight, high temperature, strong chemicals or rain. Place the mounting bracket in selected location, mark holes, drill 1/4" (7mm) holes and mount bracket with bolts, lockwashers and nuts provided. (Use self-tapping screws if not practical to use bolts.) See Illustration 1A. Put rubber washers on carriage bolts and put the bolts through the bracket holes from the inside out. Loosely attach the mount knobs onto the bolts. Place console over carriage bolt heads and tighten knobs to secure the console. **See Illustration 1B.**

*Illustration 1A*

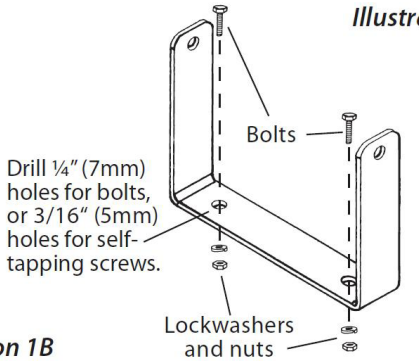
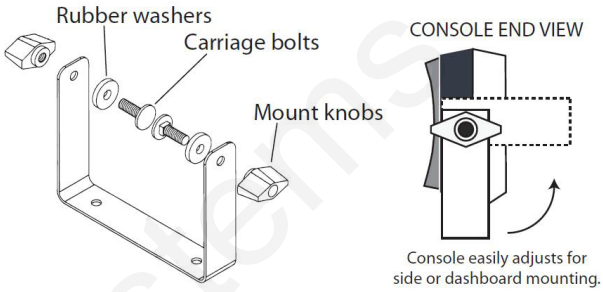



*Illustration 1B*




# Attaching the Power and Run/Hold Control Switches

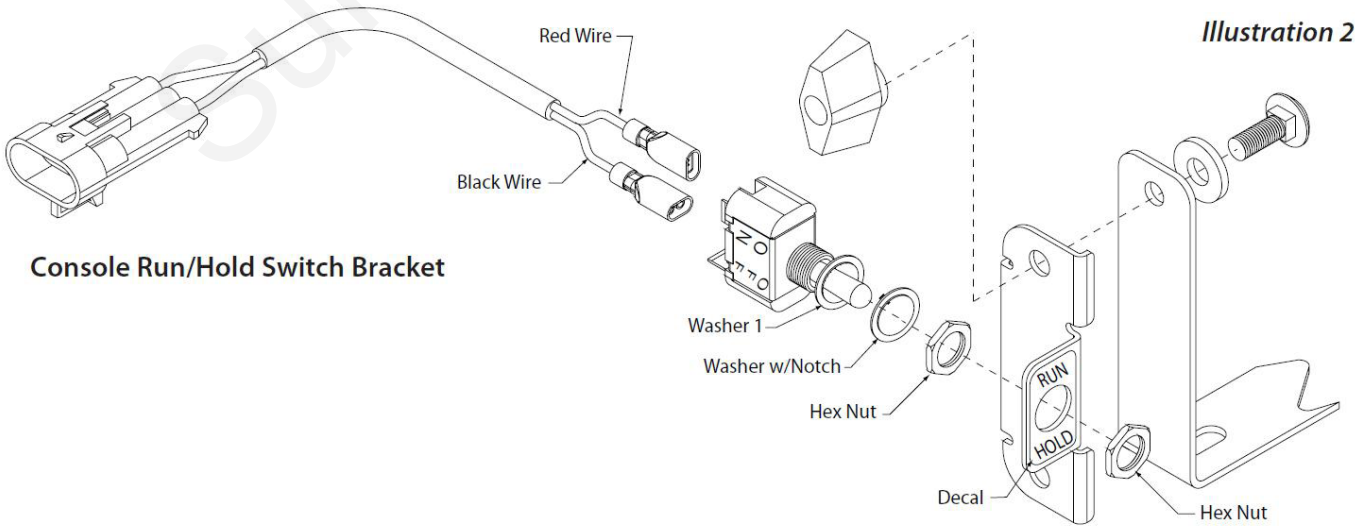
## Mounting the Run/Hold Switch Kit

Remove the mount knob from either side of the console. Install the bracket over the carriage bolt and along side the console bracket. Install the mount knob on the carriage bolt and tighten to secure the console and run/hold switch bracket in place.

Install the switch into the bracket using the steps below:
1. Place the small washer on the switch followed by the flat "notched" washer. See Illustration 2.
2. Secure the washers in place with one of the hex nuts.
3. Peel the back from the decal and secure to the front of the switch bracket. See Illustration 2.
4. Install the switch in the bracket and secure in place with the remaining hex nut. **NOTE: Make sure the "ON" connector is at to top.**
5. Attach the quick disconnects on the switch harness to the switch. The RED wire should attach to the top connection with the BLACK attaching to the bottom connection.
6. Install the switch harness connector into the mating connector (gray tie) on the console harness.

**NOTE: If using the included Power On/Off switch instead of the ignition switch connection, install the power switch as described above. Connect the power switch cable connector (2 pin) to the mating connector on the console harness.**

*Illustration 2*

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# Installation (cont)

## *Electrical Installation*

This section explains how to connect your DrillMaster to a12-volt power source, and how to connect your oil bypass valves or dump valves.

**NOTE: The DrillMaster must be connected to a 12-volt DC negative ground electrical system.**

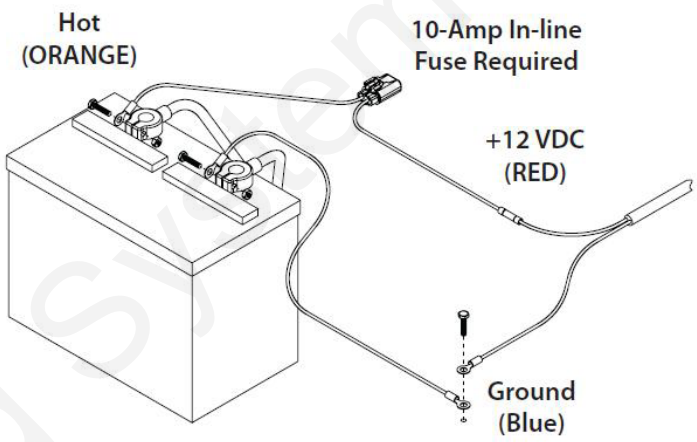
### POWER/BATTERY CONNECTION

Locate the power cable for the DrillMaster and route to the battery. When routing cable to console, avoid areas where the cable may be subjected to abrasion or excessive heat. Attach the BLUE wire (ground) to a screw or bolt on the equipment frame. **See Illustration 3**. Be sure there is a good metal-to-metal contact. Connect the ORANGE wire to the positive battery terminal. Connect the power to the DrillMaster console by plugging the 2-pin W/P tower on the power cable into the 2-pin W/P shroud of the display console.

### ON/OFF SWITCH CONNECTION

The DrillMaster system uses P/N 14360 power switch to turn the system on. If the P/N 14360 power switch is used, simply mount the switch bracket as shown on page 10, and plug the connector into the mating cable from the console.

*Illustration 3*




# Installation (cont)

## *Attaching the Speed Sensor*

The DrillMaster uses an Astro 5 GPS Speed Sensor. The speed sensor always connects to the 3-pin M/P connector with the yellow tie (on the back of DrillMaster).

**Speed calibration entered into the controller must be 0.189.**

Astro 5 GPS Speed Sensor

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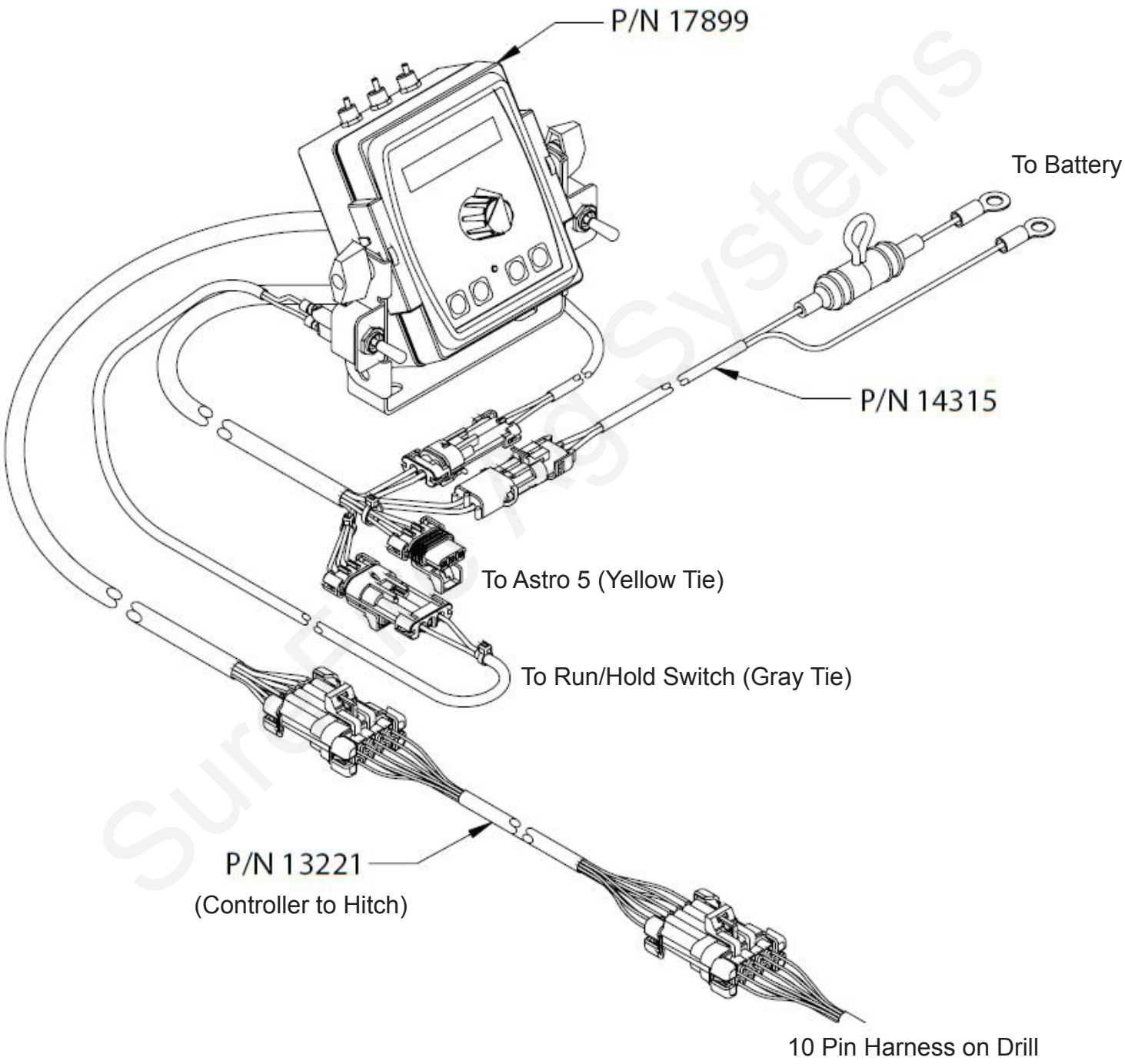
# DrillMaster Tractor Controller Wiring Layout

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# DrillMaster Console Functions

The DrillMaster features a large, easy-to-read liquid crystal display, easy-to-use rotary dial and lighted panel for night use.

SECTION ON/OFF: The Console has three Section ON/Off toggle switches on top of the console. The toggle switches turn drill sections on and off directly and also signal the Console which sections are on or off.

WEIGHT TOTALS (1) (2) (3): Displays total product lbs. applied. May be reset (Note: WEIGHT and AREA counters work in pairs, if WEIGHT counter 1 is reset, it also resets AREA counter 1).

WEIGHT/MINUTE: Displays lbs. of product dispensed per minute.

AREA/HOUR: Displays calculated Acres/Hour.

RATE: Displays application rate in lbs./acre.

AREA TOTALS (1) (2) (3): Keeps a running count of the total acres worked. May be reset. (Note: WEIGHT and AREA counters work in pairs, if WEIGHT counter 1 is reset, it also resets AREA counter 1).

DISTANCE: Displays distance traveled in feet. May be reset.

METER RPM: Displays Seed Drive Shaft RPM.

SPEED: Displays ground speed in miles per hour.

WARNING LIGHT: Indicates over or under application of 10% of the Target Rate in AUTO or Loss of Sensor Signal in Man. Also lit when in CAL.

## Soft Key Functions

AUTO/MAN — Key which changes operation from automatic control to manual valve control.

CAL — This key is used to enter & exit the calibration mode.

RESET (−) (+)

**PROGRAM KEYS:**

Used to increment and decrement the different calibration values.

- RESET when not in CAL, clears the selected counter when held for two seconds.
- When in CAL, the "+" key increases and the "-" decreases the value displayed. Adjusts Target Rate in AUTO or Application Rate in MAN.

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# DrillMaster Controller Calibration

## *Standard Calibration Setup Procedure*

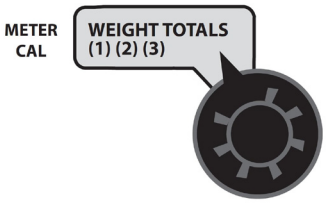
1.Turn all section switches off and put system in hold.

2. Press CAL for one (1) second to enter calibration mode. Red light will be on steady and CAL will be displayed in CAL mode.

3.Turn the dial to the items listed below and set as instructed. Numbers can be changed by using the "+" or "-" buttons.

4. When complete, press CAL for one (1) second to exit CAL mode. Red light should go out and CAL will not be displayed. You MUST exit Calibration mode to save your settings.

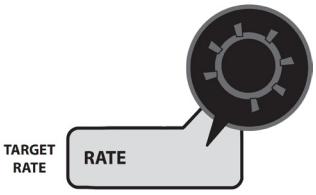
**METER CAL:** Enter the starting calibration number from the Hydraulic Drive Meter Cal Chart on next page. To find your correct starting CAL number, choose the crop you are drilling and your slot opening, and enter the number from the chart into the DrillMaster. These are starting calibration numbers for average seed properties. The Meter Cal will be adjusted later in the DrillMaster calibration process.



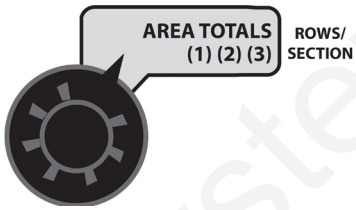

**ROW SPACING:** Enter the row spacing in inches of your implement here.

**ADJUST RATE:** Enter the value for the desired amount of change in lbs./acre to be used for making on the go rate adjustments when operating in AUTO. For example, if a value "1.0" is entered, you will be able to increase or decrease your seeding rate in one-lb. increments during operation in AUTO.

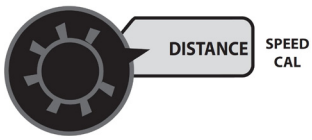
**TARGET RATE:** Enter the value for the desired or Target Rate in lbs./acre. It can range from 0.00 to 99,999. This is the seeding rate the console will lock onto when operating in AUTO.



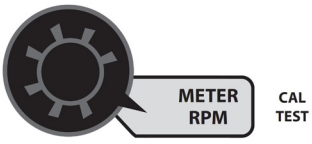
**ROWS/SECTION:** This displays the rows per section for the section selected. Unused sections must be programmed to zero rows. The DrillMaster can have up to three sections. NOTE: the controller must be out of HOLD and be in RUN to enter rows/section. Turn section one on while the other two sections are off. The corresponding section icon 1 will turn on and the number of rows in that section can then be adjusted. After section one is entered, turn it off and turn section two on, then turn two off and turn the section 3 on and adjust. When finished, turn the DrillMaster back to hold and the screen will display no SECtn. If you are on a single or two section drill, the sections not being used must be set to 0 rows.



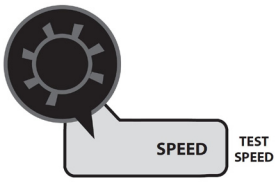

**SPEED CAL:** For the ASTRO 5 which is included with the DrillMaster, this setting should be .189.




**CAL TEST:** This is not a true "Calibration Factor" but rather a method of testing the drill to determine the most accurate METER CAL factor. This will be used in the Pre-Planting Seed Calibration Process.




**TEST SPEED:** This is also not a true "Calibration Factor". TEST SPEED along with CAL TEST will be used in the Pre-Planting Seed Calibration Process.

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# Hydraulic Drive Meter Calibration Numbers

***These are starting calibration values. They can be refined for your drill and seed using the Pre-Planting Seed Calibration Process or the In-Field Seed Calibration Process.***

| CROP | 1/8" | 3/16" | ¼" | 3/8" | ½" | 5/8" | ¾" |
|---|---|---|---|---|---|---|---|
| ALFALFA | 12638 | | 7222 | | | | |
| BARLEY | | | | | 5857 | 4747 | 3956 |
| CANOLA | | 10920 | 8126 | 5460 | | | |
| CORN | | | | | 10677 | 7909 | 6280 |
| COTTON | | | | | 7909 | 6673 | 5338 |
| FESCUE | | | | 14236 | 10677 | 8213 | |
| MILLET | | 16177 | 10400 | 7663 | | | |
| MILO | | 14444 | 10111 | 5321 | | | |
| OATS | | | | | 11868 | 9020 | 6731 |
| PINTO BEANS | | | | | 8986 | 6787 | 5696 |
| RICE | | | | | 6664 | 5308 | 4539 |
| RYE | | | | | 4606 | 3600 | 2796 |
| SOYBEAN | | | | 10103 | 6960 | 5220 | 4176 |
| WHEAT | | | | | 4107 | 3286 | 2738 |

# Initial Operation to Test DrillMaster Setup

***First we will test the system in Manual Mode.***

1. Turn your hydraulic valve on for the hydraulic drive.

2. Push the AUTO/MAN button until MAN is displayed on the DrillMaster. You are now in Manual mode.

3. Put the system in RUN. Turn the console switch to RUN and lower the implement to actuate the mercury Run/Hold switch mounted on the drill.

4. Turn Section 1 switch ON.

5. Turn dial to WEIGHT/MINUTE position. Is a number displayed? If so push the "+" button. Does the number increase? Push the "-" button. Does the number decrease?

6. If no reading in WEIGHT/MINUTE is the hydraulic drive turning.

7. If drive is not turning, check hydraulic connections and try hydraulic control lever in the opposite direction.

8. If drive is turning, but no reading on the WEIGHT/MINUTE, check the speed sensor connections, sensor gap to target wheel and the Meter Cal value. Proceed to the next step when you can increase and decrease the WEIGHT/MINUTE reading using the "+" and "-" keys on the DrillMaster.

9. Turn each section switch on and off. Does each section turn on and off when commanded? With any single section on is there a number displayed for WEIGHT/MINUTE.

10. Turn the dial to SPEED. Drive the tractor. Does the speed reading seem reasonable and correct? The ASTRO 5 will be a more accurate speed than an un-calibrated tractor speedometer. You are now ready to test AUTO mode. You can drive the tractor and verify the system works correctly.

11. If you want to sit still, you can enter Calibration Mode, then turn the dial to TEST SPEED. Using the "+" key increase the speed to your operating speed. Turn the Run/Hold and section switches on. The system will now perform as if it is traveling at the speed you entered.

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# Pre-Planting Seed Calibration Process (using CAL TEST function)

***This procedure is used prior to field operation. These steps will determine a more accurate Meter Cal value for your exact drill settings with your seed.***

**Preparation**

1. Set the slot opening on each drill section for the desired crop.

2. Fill drill with seed.

3. Disconnect a few or all drop tubes on each section.

4. Position catch container under each drop.

**Enter Calibration Mode (switch controller to hold and press the "CAL" button until the red light is solid)**

1. Turn Rotary Position Switch to "Cal Test", "Off" appears in the display, press "+" to activate the Calibration Test mode "1" appears in the display (a one (1) lb sample will be dispensed from each opener).

2. Turn Rotary Position Switch to "Test Speed".

3. Use "+" to enter normal operating speed.

4. Turn Rotary Position Switch back to "Cal Test".

5. Switch from the hold to the run position and turn all section on. The "Cal Test" will begin. The display will count up the measured sample weight and automatically turn off at one (1) lb.

6. Combine the samples and weigh, then calculate the average sample weight.

7. Adjust the controller measured weight (1 lb) to the actual average sample weight. Use the "+" and "-" buttons to adjust the weight.

8. Press and Hold "CAL" until red light is off to exit calibration. This saves the new calibration settings.

9. Re-run test to verify calibration is accurate.

10. Re-enter calibration mode and turn dial to Meter Cal. Make a note of the Meter Cal for your drill and seed in the DrillMaster manual.

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# In-Field Seed Calibration Process

***This procedure will be used to find a more accurate Meter Cal value during normal field operation. You could place a known weight of seed in the drill and drill until it is gone during this process. If you have access to a scale, you could weigh the drill full of seed, then after drilling some amount. You will need to use some procedure to determine the actual weight of seed dispensed.***

1. Clear a weight counter by selecting the Weight position and pressing "-" key for 1 second while in hold.

2. Operate the drill in the field. The measured seed weight will accrue in the weight counter you reset in step 1.

3. Find the total actual weight of seed dispensed.

4. Enter Calibration mode by pressing CAL for 1 second. Red light will come on steady.

5. Turn dial to the Meter Cal position. The current Meter Cal will be displayed.

6. Push CAL key to toggle to the weight. Use the "+" and "-" buttons to adjust the weight to the actual weight drilled. The DrillMaster will automatically change the Meter Cal value.

7. Push CAL key to toggle back to the new Meter Cal value. Make a note of the new value in you operators manual for future reference.

8. Press and Hold "CAL" until red light is off to exit calibration. This saves the new calibration settings.

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